

## AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

### Listing of Claims:

- 1      1. (Currently amended) A computer program product-method for
- 2      computing interval parameter bounds from fallible measurements, comprising:
- 3            receiving a set of measurements  $z_1, \dots, z_n$ , wherein an observation model
- 4      describes each  $z_i$  as a function of a  $p$ -element vector parameter  $\mathbf{x} = (x_1, \dots, x_p)$ ,
- 5            wherein receiving the set of measurements involves
- 6            receiving values for a set of conditions  $c_1, \dots, c_n$  under which the
- 7            corresponding observations  $z_i$  were made,
- 8            wherein equations in the system of nonlinear equations
- 9            account for the conditions  $c_i$  and are of the form  $z_i - h(\mathbf{x} | c_i) = 0$
- 10          ( $i=1, \dots, n$ ), and
- 11          wherein each condition  $c_i$  is not known precisely but is
- 12          contained within an interval  $c_i^l$ ;
- 13          storing the set of measurements  $z_1, \dots, z_n$  in a memory in a computer
- 14      system;
- 15          forming a system of nonlinear equations  $z_i - h(\mathbf{x}) = 0$  ( $i=1, \dots, n$ ) based on
- 16      the observation model; and
- 17          solving the system of nonlinear equations to determine interval parameter
- 18      bounds on  $\mathbf{x}$ .

1           2. (Currently amended) The computer program product-method of claim 1,  
2 wherein the system of nonlinear equations is an “overdetermined system” in  
3 which there are more equations than unknowns.

1           3. (Currently amended) The computer program product-method of claim 1,  
2 wherein each measurement  $z_i$  is actually a  $q$ -element vector of measurements  $\mathbf{z}_i =$   
3  $(z_{i1}, \dots, z_{iq})^T$ , and  $h$  is actually a  $q$ -element vector of functions  $\mathbf{h} = (h_1, \dots, h_q)^T$ .

1           4 (Canceled).

1           5. (Currently amended) The computer program product-method of claim 1  
2 ~~claim 4~~, wherein each condition  $c_i$  is actually an  $r$ -element vector of conditions  $\mathbf{c}_i$   
3  $= (c_{i1}, \dots, c_{ir})^T$ .

1           6 (Canceled).

1           7. (Currently amended) The computer program product-method of claim 1  
2 ~~claim 4~~, wherein equations in the system of nonlinear equations are of the form  $z_i$   
3  $- h(\mathbf{x} | c_i) + \varepsilon^I(\mathbf{x}, c_i) = 0$  ( $i=1, \dots, n$ ), which includes an error model  $\varepsilon^I(\mathbf{x}, c_i)$  that  
4 provides interval bounds on measurement errors for  $z_i$ .

1           8. (Currently amended) The computer program product-method of claim 7,  
2 wherein if  $z_i$  is actually a  $q$ -element vector of measurements  $\mathbf{z}_i = (z_{i1}, \dots, z_{iq})^T$ , then  
3  $\varepsilon^I$  is actually a  $q$ -element vector  $\boldsymbol{\varepsilon}^I = (\varepsilon_1, \dots, \varepsilon_q)^T$ .

1           9. (Currently amended) The computer program product-method of claim 7,  
2 wherein if there exists no solution to the system of nonlinear equations, the  
3 method further comprises determining that at least one of the following is true:

4           at least one of the set of measurements  $z_i, \dots, z_n$  is faulty;  
5           the observation model  $h(\mathbf{x} | c_i)$  is false;  
6           the error model  $\varepsilon^l(\mathbf{x}, c_i)$  is false; and  
7           the computational system used to compute interval bounds on elements of  
8         $\mathbf{x}$  is flawed.

1           10. (Currently amended) The computer program product method of claim  
2        1, wherein solving the system of nonlinear equations involves:  
3           linearizing the system of nonlinear equations to form a corresponding  
4        system of linear equations; and  
5           solving the system of linear equations.

1           11. (Currently amended) The computer program product method of claim  
2        10, wherein solving the system of nonlinear equations involves using Gaussian  
3        Elimination.

1           12. (Currently amended) A computer-readable storage medium storing  
2        instructions that when executed by a computer cause the computer to perform a  
3        method for computing interval parameter bounds from fallible measurements,  
4        wherein the computer-readable storage medium includes magnetic storage  
5        devices, optical storage devices, disk drives, magnetic tape, CDs (compact discs),  
6        and DVDs (digital versatile discs or digital video discs), the method comprising:  
7           receiving a set of measurements  $z_1, \dots, z_n$ , wherein an observation model  
8        describes each  $z_i$  as a function of a  $p$ -element vector parameter  $\mathbf{x} = (x_1, \dots, x_p)_1$   
9           wherein receiving the set of measurements involves  
10          receiving values for a set of conditions  $c_1, \dots, c_n$  under which the  
11          corresponding observations  $z_i$  were made,

12                   wherein equations in the system of nonlinear equations  
13                   account for the conditions  $c_i$  and are of the form  $z_i - h(\mathbf{x} | c_i) = 0$   
14                   ( $i=1, \dots, n$ ), and  
15                   wherein each condition  $c_i$  is not known precisely but is  
16                   contained within an interval  $c_i^l$ ;  
17                   storing the set of measurements  $z_1, \dots, z_n$  in a memory in a computer  
18                   system;  
19                   forming a system of nonlinear equations  $z_i - h(\mathbf{x}) = 0$  ( $i=1, \dots, n$ ) based on  
20                   the observation model; and  
21                   solving the system of nonlinear equations to determine interval parameter  
22                   bounds on  $\mathbf{x}$ .

1                   13. (Original) The computer-readable storage medium of claim 12,  
2                   wherein the system of nonlinear equations is an “overdetermined system” in  
3                   which there are more equations than unknowns.

1                   14. (Original) The computer-readable storage medium of claim 12,  
2                   wherein each measurement  $z_i$  is actually a  $q$ -element vector of measurements  $\mathbf{z}_i =$   
3                    $(z_{i1}, \dots, z_{iq})^T$ , and  $h$  is actually a  $q$ -element vector of functions  $\mathbf{h} = (h_1, \dots, h_q)^T$ .

1                   15 (Canceled).

1                   16. (Currently amended) The computer-readable storage medium of claim  
2                   12-claim 15, wherein each condition  $c_i$  is actually an  $r$ -element vector of  
3                   conditions  $\mathbf{c}_i = (c_{i1}, \dots, c_{ir})^T$ .

1                   17 (Canceled).

1           18. (Currently amended) The computer-readable storage medium of claim  
2   12-claim 15, wherein equations in the system of nonlinear equations are of the  
3   form,

4    $z_i - h(\mathbf{x} | c_i) + \varepsilon^I(\mathbf{x}, c_i) = 0$  ( $i=1, \dots, n$ ), which includes an error model  $\varepsilon^I(\mathbf{x}, c_i)$  that  
5   provides interval bounds on measurement errors for  $z_i$ .

1           19. (Original) The computer-readable storage medium of claim 18,  
2   wherein if  $z_i$  is actually a  $q$ -element vector of measurements  $\mathbf{z}_i = (z_{i1}, \dots, z_{iq})^T$ , then  
3    $\varepsilon^I$  is actually a  $q$ -element vector  $\varepsilon^I = (\varepsilon_1, \dots, \varepsilon_q)^T$ .

1           20. (Original) The computer-readable storage medium of claim 18,  
2   wherein if there exists no solution to the system of nonlinear equations, the  
3   method further comprises determining that at least one of the following is true:

4           at least one of the set of measurements  $z_1, \dots, z_n$  is faulty;  
5           the observation model  $h(\mathbf{x} | c_i)$  is false;  
6           the error model  $\varepsilon^I(\mathbf{x}, c_i)$  is false; and  
7           the computational system used to compute interval bounds on elements of  
8    $\mathbf{x}$  is flawed.

1           21. (Original) The computer-readable storage medium of claim 12,  
2   wherein solving the system of nonlinear equations involves:  
3           linearizing the system of nonlinear equations to form a corresponding  
4   system of linear equations; and  
5           solving the system of linear equations.

1           22. (Original) The computer-readable storage medium of claim 21,  
2   wherein solving the system of nonlinear equations involves using Gaussian  
3   Elimination.

1           23. (Currently amended) An apparatus that computes interval parameter  
2 bounds from fallible measurements, comprising:  
3           a receiving mechanism configured to receive a set of measurements  
4            $z_1, \dots, z_n$ , wherein an observation model describes each  $z_i$  as a function of a  
5            $p$ -element vector parameter  $\mathbf{x} = (x_1, \dots, x_p)$ ,  
6           wherein receiving the set of measurements involves  
7           receiving values for a set of conditions  $c_1, \dots, c_n$  under which the  
8           corresponding observations  $z_i$  were made,  
9           wherein equations in the system of nonlinear equations  
10          account for the conditions  $c_i$  and are of the form  $z_i - h(\mathbf{x} | c_i) = 0$   
11          ( $i=1, \dots, n$ ), and  
12          wherein each condition  $c_i$  is not known precisely but is  
13          contained within an interval  $c_i^l$ ;  
14          a memory in a computer system for storing the set of measurements  
15           $z_1, \dots, z_n$ ;  
16          an equation forming mechanism configured to form a system of nonlinear  
17          equations  $z_i - h(\mathbf{x}) = 0$  ( $i=1, \dots, n$ ) based on the observation model; and  
18          a solver configured to solve the system of nonlinear equations to determine  
19          interval parameter bounds on  $\mathbf{x}$ .

1           24. (Original) The apparatus of claim 23, wherein the system of nonlinear  
2 equations is an “overdetermined system” in which there are more equations than  
3 unknowns.

1           25. (Original) The apparatus of claim 23, wherein each measurement  $z_i$  is  
2 actually a  $q$ -element vector of measurements  $\mathbf{z}_i = (z_{i1}, \dots, z_{iq})^T$ , and  $h$  is actually a  
3  $q$ -element vector of functions  $\mathbf{h} = (h_1, \dots, h_q)^T$ .

1           26 (Canceled).

1           27. (Currently amended) The apparatus of claim 23-claim 26, wherein each  
2        condition  $c_i$  is actually an  $r$ -element vector of conditions  $\mathbf{c}_i = (c_{i1}, \dots, c_{ir})^T$ .

1           28 (Canceled).

1           29. (Currently amended) The apparatus of claim 23-claim 26, wherein  
2        equations in the system of nonlinear equations are of the form  $z_i - h(\mathbf{x} | c_i) + \varepsilon^l(\mathbf{x},$   
3         $c_i) = 0$  ( $i=1, \dots, n$ ), which includes an error model  $\varepsilon^l(\mathbf{x}, c_i)$  that provides interval  
4        bounds on measurement errors for  $z_i$ .

1           30. (Original) The apparatus of claim 29, wherein if  $z_i$  is actually a  $q$ -  
2        element vector of measurements  $\mathbf{z}_i = (z_{i1}, \dots, z_{iq})^T$ , then  $\varepsilon^l$  is actually a  $q$ -element  
3        vector  $\varepsilon^l = (\varepsilon_1, \dots, \varepsilon_q)^T$ .

1           31. (Original) The apparatus of claim 29, wherein if there exists no  
2        solution to the system of nonlinear equations, the solver is configured to  
3        determine that at least one of the following is true:  
4           at least one of the set of measurements  $z_i, \dots, z_n$  is faulty;  
5           the observation model  $h(\mathbf{x} | c_i)$  is false;  
6           the error model  $\varepsilon^l(\mathbf{x}, c_i)$  is false; and  
7           the computational system used to compute interval bounds on elements of  
8         $\mathbf{x}$  is flawed.

1           32. (Original) The apparatus of claim 23, wherein the solver is configured  
2        to:

3           linearize the system of nonlinear equations to form a corresponding system  
4       of linear equations; and to  
5       solve the system of linear equations.

1           33. (Original) The apparatus of claim 32, wherein the solver is configured  
2       to solve the system of nonlinear equations using Gaussian Elimination.